PATENT SPECIFICATION 1 498 024

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(21) Application No. 49271/74 (22) Filed 14 Nov. 1974
(23) Complete Specification filed 30 Oct. 1975
(44) Complete Specification published 18 Jan. 1978
(51) INT. CL.³ E05B 9/00
E05C 3/26
(52) Index at acceptance
E2A C8A2U C8G C8L D5C2C
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(19)

(54) MOTOR VEHICLE DOOR LATCH

(71) We, GENERAL MOTORS LIMITED, a British Company of High Street North, Dunstable, Bedfordshire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to motor-vehicle door latches and is applicable, for example, to motor-vehicle door latches of the type wherein a locking member locks the latch by moving part of the unlatching mechanism of the latch into a position in which it idles and cannot disengage the latch.

A latch of this type, for installation within the door of a motor-vehicle, is disclosed in British patent specification No. 1 249 806. A problem that can occur with such a latch when installed in a vehicle door, and could occur with other latches, if similarly installed, is that of the ingress of dust or water into the interior of the door through the opening in the door provided for entry of a striker pin into engagement with the latch mechanism, which ingress of dust or water can lead to contamination of, and possible premature seizure of, operating components of the latch and other mechanisms housed within the door such as the window winding mechanism. Moreover, there is the possibility of cold air striking the window in the door and being forced through the interior of the door and said striker pin opening into the interior of the car as a cold draught. To prevent this possibility, it is necessary to have a sealing strip along the edge of the door inboard of the striker pin opening in the door, and the accurate placement and retention of this door strip in position on the door can be difficult.

A motor-vehicle door latch according to this invention, for installation within a motor-vehicle door, comprises a frame member; a cover plate member; a shroud of a non-metallic moulded material sandwiched between said frame member and said cover plate member, said shroud having apertures therein extending between said frame member and said cover plate member; a forked latch bolt pivotally mounted by a pivot pin which is supported by at least one of said members and extends through one of said apertures; a detent member pivotally mounted by a second pivot pin which is supported by at least one of said members and extends through another of said apertures, said detent member being engageable with said forked latch bolt and being releasable therefrom by rotational movement; and a detent operating member mounted on said detent member between the detent member and the cover plate; said shroud being recessed and apertured so as to house said forked latch bolt, said detent member and said detent operating member and said detent member and said forked latch bolt being separated by said shroud from further operating components of said latch.

Preferably an entry channel for a headed striker pin is moulded within the shroud adjacent said forked latch bolt, and the sides of said channel serve as guide parts for the head of said sriker pin.

The appended claims define the scope of the invention claimed. The invention and how it may be performed are hereinafter particularly described with reference to the accompanying drawings, in which:—

Figure 1 is an isometric view of a right-hand front door latch according to one embodiment of the invention, showing the operating components of the latch which, when the latch is installed in the door, are located inside the door;

Figure 2 is an isometric exploded view of part of the door latch of Figure 1,

showing the operating components of the latch concealed from view in Figure 1;

Figure 3 is a bottom view of a part of the door latch of Figure 1;

Figure 4 is a cross-sectional view of Figure 3 taken on the line 4-4′ of Figure 3;

Figure 5 is a side view of Figure 3 taken in the direction indicated by the arrow 5 in Figure 3;

Figure 6 is a cross-sectional view of Figure 3 taken on the line 6-6′ of Figure 3;

Figure 7 is a bottom view of a modified part of the door latch of Figure 1;

Figure 8 is a cross-sectional view of Figure 7 taken on the line 8-8′ of Figure 7;

Figure 9 is a cross-sectional view of Figure 7 taken on the line 9-9′ of Figure 7;

Figure 10 is a side view of Figure 7 taken in the direction indicated by the arrow 10 in Figure 7;

Figure 11 is a cross-sectional view of a portion of a door latch according to a second embodiment of the invention; and

Figure 12 is a cross-sectional view of a portion of a door latch, with parts broken away, according to a third embodiment of the invention.

Referring now to Figure 1 of the drawings, the latch 12 comprises an L-section frame 14 adapted to be secured to the inside of a vehicle door, a cover plate 16, and a shroud 18 of a non-metallic moulded material sandwiched between the frame 14 and the cover plate 16.

Referring to Figure 2, this exploded view of part of the door latch shows a forked latch bolt 20 pivotally mounted upon a pivot pin 22 which is mounted in bearings in the frame 14 and the cover plate 16 and extends through an aperture 24 in the shroud 18. A detent member 26, in the form of a flat lever having a tooth 28 at one end thereof, is pivotally mounted at the other end thereof upon a second pivot pin 30, which pin is also mounted in bearings in the frame 14 and the cover plate 16 and extends through a cylindrical aperture 32 in the shroud 18. A detent operating member 34 comprises a lever 36 having at one end a cylindrical boss 38 thereon extending at right angles to the plane of the lever, said cylindrical boss 38 having a coaxial bore 40 therethrough. The second pivot pin 30 passes through the coaxial bore 40, and the cylindrical boss 38 is housed within the cylindrical aperture 32 in the shroud 18 with just sufficient clearance to allow the detent operating member 34 to pivot within aperture 32 about the second pivot pin 30. The central portion of the lever 36 is housed in a channel-shaped recess 42 in the shroud 18. The lever 36 has at the other end thereof a rectangular nose portion 44 and an operture 46. The annular end face of the cylindrical boss 38 remote from the lever 36 has a key portion (not shown) extending therefrom, which key portion is an interference fit in a slotted aperture 48 in the detent member 26, such that movement of the detent operating member 34 produces corresponding movement of the detent member 26.

Frame 14 has an opening 50 therein to allow the entry of a headed striker pin (not shown) between the legs 52, 54 of the forked latch bolt 20. The relative positions of the pivot pins 22 and 30 on the frame 14 are such that the movement of the forked latch bolt 20 about pivot pin 22 caused by the entry of the headed striker pin results in the sequential engagement of the tooth 28 first with the tip of leg 52 (to hold the bolt 20 in an intermediate, safety-latched position) and then with the tip of leg 54 (to hold the bolt 20 in a fully-latched position).

Referring again to Figure 1, it can be seen that only said other end of the lever 36 bearing the nose portion 44 and the aperture 46 is exposed to view, the remaining movable components of the latch so far described being housed within the shroud 18. A coil spring 56 connected at one end in the aperture 46 and at the other end to an upturned portion 58 of the cover plate 16 biases the detent operating member 34 and the detent member 26 towards the forked bolt 20.

To permit unlatching of the door latch there is arranged, when the latch is unlocked, below said nose portion 44 a transverse arm 60 of an upwardly and downwardly displaceable link 62. The link 62 forms part of an unlatching mechanism which can be operated both by an inside handle or the like and by an externally mounted control such as a push-button. To this end, for internal unlatching, the lower end of the link 62 is pivoted to one end of a bell-crank lever 64 pivotally mounted on the frame 14. The inside operating means (not shown) for unlatching the door latch is attached to the other end 66 of the bell-crank lever 64.

External unlatching of the door latch is obtained by a linkage (not shown) connected to an outside latch release lever 68 which is connected indirectly via shaft 70 and hooked lever 72 to the lower end of the link 62 to effect upward displacement of the link 62 upon the anti-clockwise movement of the latch release lever 68. Downward displacement of the link 62 is achieved by a helical spring 74 on the bell-crank lever 64 which biases said bell-crank lever towards anti-clockwise motion relative

to the frame 14.

Upward displacement of the link 62 sufficiently to cause the transverse arm 60 to bear against the nose portion 44 will, in turn, cause the detent operating member 34 and the detent member 26 to pivot about pivot pin 30 to release the tooth 28 from engagement with the tip of leg 54 of the forked bolt 20. When the bolt 20 is in the fully-latched position, a resilient force is exerted upon the head of the striker-pin in a manner that will be described in detail later in the specification. Once the tooth 28 is moved out of engagement with the tip of leg 54, the forked bolt 20 will pivot, under a reaction force produced by said striker pin in response to said resilient force, to an unlatching position, thus releasing the striker pin.

In order to lock the door latch, provision is made to displace the link 62 laterally so that, when the door latch is in a locked condition, operation of the bell-crank lever 64 or the outside latch release lever 68 to move the link 62 causes this link 62 to move idly upwards without engaging the nose portion 44 of the detent operating member 34. To this end, a locking bell-crank lever 76 is pivotally mounted on frame 14 and carries at the lower end of its downwardly extending arm pin 78 which is slidably received within a slot 80 formed in the link 62. When the door latch is in an unlocked condition as shown in Figure 1, the link 62 can be displaced upwardly, while the pin 78 slides within slot 80, to engage nose portion 44 of the detent operating member 34 to move the latter out of a bolt holding position. However, when the locking lever 76 is pivoted in an anti-clockwise direction as viewed in Figure 1, the pin 78 displaces the link 62 away from the cover plate 16 to move the arm 60 of link 62 out of reach of the nose portion 44.

Locking of the door latch is obtained by downward displacement of an upwardly-extending arm 82 of locking lever 76. When the door latch is installed in a vehicle door, the arm 82 may be connected either to a door sill push button or to an inside locking handle. External locking of the installed door latch is obtained by the actuation of a suitable key-operated locking device (not shown), which causes pivoting of locking lever 76 in said anti-clockwise direction by means of a bent rod 84 journalled in a cup-shaped sleeve 86 (Figure 2) formed in the shroud 18 and retained therein by means of the cover plate 16.

Provision is made to prevent inadvertent locking of the installed door latch when the door is open. If the latch is put into a locked condition with the door open, closing of the door to produce engagement of the striker pin with the forked bolt 20 causes anticlockwise pivoting of the forked bolt as seen in Figure 2. This in turn causes the detent member 26 to perform up and down movement as the tooth 28 rides over the surface of the bolt until the fully-latched position described earlier is reached. This up and down movement is communicated to the detent operating member 34, and, as the nose portion 44 thereof moves upwardly, it comes into engagement with the arm 82 of locking lever 76 and causes the clockwise rotation (as seen in Figure 1) of locking lever 76 to move the link 62 back to its unlocked position in which unlatching of the forked bolt can be carried out as described previously.

Referring again to Figure 2, an entry channel 88 (see Figure 3) for the head of the striker pin is formed in the shroud 18 and terminates in an aperture 90 in the upper surface of the shroud as seen in Figure 2. The sides 92 and 94 of the entry channel 88 serve as guide surfaces for the head of the striker pin as it engages with the legs 52, 54 of the forked bolt 20. As can be seen in Figure 2, apertures 24 and 90 in shroud 18 are separated by a narrow flexible strip 96 of the shroud. A buffer 98 of a resilient material such as rubber, shaped to fit the contours of aperture 24, is pivotally mounted upon the pivot pin 22. The buffer 98 braces the flexible strip 96 against the impact of the head of the striker pin, and becomes compressed by said head as the forked bolt 20 moves into the fully-latched position. Consequently, the resilient force referred to earlier in the specification is generated between the buffer 98 and the head of the striker pin.

As will be appreciated from Figures 1 and 2 of the drawings and from the description of the door latch given so far, the forked bolt 20 and the detent member 26 are effectively isolated in a dust-free manner from the remaining operating components of the latch by means of the shroud 18, so ensuring that these remaining operating components remain substantially free from dust. The shroud 18 is shown in detail in Figures 3, 4, 5 and 6 of the drawings. As can be seen in these Figures, the base of the shroud 18 is formed by a peripheral wall 100 surrounding a flat-bottomed recess 102 which overlies that portion of the frame 14 on which is mounted the pivot pins 22 and 30. The main body of the shroud 18 is a solid block of non-metallic material, such as polypropylene, pierced by apertures 24, 32 and 90 and having formed therein the entry channel 88 for the head of the striker pin, the recess 42 to house the central portion of the lever 36, and a recess 104 into which the trans-

verse arm 60 extends and the arm 82 of locking lever 76 moves when the latch assembly is placed in a locked condition. One end of the shroud 18 includes the cup-shaped sleeve 86, and the other end of the shroud 18 includes a similar cup-shaped sleeve 106, which serves as a bearing for the rod 70.

When the shroud 18 is placed in position upon the frame 14, the peripheral wall 100 comes into dust-sealing engagement with the frame 14, thus producing an enclosure housing the forked bolt 20 and the detent member 26. A front wall 108 of the shroud 18 comes into dust-sealing engagement with that portion of the frame 14 surrounding the aperture 50, said wall 108 being provided with a protrusion 109 therefrom surrounding the entry channel 88, the peripheral edge of said protrusion 109 being an interference fit in the aperture 50 in frame 14. Once the cover plate 16 is fastened in position upon the shroud 18, thus sandwiching the shroud 18 between the frame 14 and the cover plate 16, it closes apertures 24, 32 and 90. Consequently, any dust that might enter the channel 88 of the shroud 18 is retained either within that channel or within the enclosure formed between the frame 14 and the recess 102 of the shroud 18.

Figures 7, 8, 9 and 10 show details of a modified form of shroud 18 which is lighter in weight and requires less material for its construction. Like reference numerals are used on these Figures to indicate those parts of the modified shroud that correspond to the shroud shown in Figures 1 to 6. The main structural difference between the two forms of shroud is that the flexible strip 96 is replaced by a flexible strip-like portion 110, having a free end which is located within a slot in a buffer pad 112 of resilient material. The buffer pad 112, which is located in a recess adjacent the aperture 24 of the shroud 18, replaces the buffer 98 shown in Figure 2.

As can be seen in Figures 7 and 9, the recess 102 for the forked bolt 20 and detent member 26 is no longer planar but is stepped along arc 114 which corresponds to the arc swept out by the legs of the forked bolt 20 as it pivots on pin 22.

A saving in the material required for constructing the modified shroud 18 is produced by decreasing the area of the front wall 108 (see Figure 10), and by arranging for the apertures 24 and 32, the entry channel 88, and the recesses 42, 102 and 104 to have peripheral walls thereto strengthened at strategic points by buttresses 116 (Figures 7 and 8) and ribs 118 (Figures 9 and 10).

Although the modified shroud shown in Figures 7 to 10 differs slightly in construction from the shroud shown in Figures 1 to 6, it co-operates with the frame 14 and the cover plate 16 in exactly the same way so as to isolate the forked bolt 20 and the detent member 26 from the other operating components of the latch in a substantially dust-free manner.

Figure 11 shows a portion of a door latch according to a second embodiment of the invention, like components being identified by like reference numerals. In the door latch shown in Figure 11, the detent operating member 34 is a pin riveted at one end to the detent member 26 and extending at right angles thereto through a slotted aperture 119 in the shroud 18. The free end of the pin is contactable by the transverse arm 60 of the displaceable link 62 in order to cause the detent member 26 to pivot about the pivot pin 30 to release the forked bolt 20 of the latch. In this embodiment, the coil spring 56 is located inside a recess in the shroud 18 adjacent the detent member 26, and biases the detent member 26 towards the forked bolt 20.

A further modification of the latch shown in Figure 11 is shown partly, in cross-section, in Figure 12. This third embodiment of the latch has a detent operating member 34 composed of a lever 36 pivotally mounted upon pivot pin 30 between the cover plate 16 and the shroud 18, in wiping engagement with the surface of said shroud, and a pin 120 riveted at one end to the detent member 26 and extending at right angles thereto through a slotted aperture 119 in the shroud 18 and an aperture 121 in the lever 36. Thus, when the nose portion 44 (not shown) of the lever 36 is displaced by the transverse arm 60 of the displaceable link, this displacement movement is transferred to the detent member 26 through pin 120, since the pin 120 is a close fit in the aperture 121 in lever 36. The lateral dimension of lever 36 in the region of the aperture 121 is arranged to be sufficient to fully cover, and thus effectively seal, the slotted aperture 119 in the shroud 18 throughout the operating movement of the detent operating member 34.

A door latch according to the invention when installed within a vehicle door can operate effectively as a door latch with minimal risk of any dust or water passing into the interior of the door through the open striker pin entry channel of the latch. Moreover, the possibility of cold air passing into the vehicle by deflection from the window pane through the interior of the door and the latch is markedly decreased, thus making it possible to place draught-proofing strips for the door outboard of the latch without risks of draughts through the latch. Such a re-siting of the draught-

proofing strips can have the useful extra advantage of decreasing the noise heard from outside the vehicle if the door of the vehicle is slammed to a closed position.

WHAT WE CLAIM IS:—

1. A motor-vehicle door latch for installation within a motor-vehicle door, said latch comprising a frame member; a cover plate member; a shroud of a non-metallic moulded material sandwiched between said frame member and said cover plate member, said shroud having apertures therein extending between said frame member and said cover plate member; a forked latch bolt pivotally mounted by a pivot pin which is supported by at least one of said members and extends through one of said apertures; a detent member pivotally mounted by a second pivot pin which is supported by at least one of said members and extends through another of said apertures, said detent member being engageable with said forked latch bolt and being releasable therefrom by rotational movement; and a detent-operating member mounted on said detent member between the detent member and the cover plate; said shroud being recessed and apertured so as to house said forked latch bolt, said detent member and said detent operating member and said detent member and said forked latch bolt being separated by said shroud from further operating components of said latch.

2. A motor-vehicle door latch according to Claim 1, in which an entry channel for a headed striker pin is moulded within the shroud of non-metallic moulded material, the sides of said entry channel acting as guide parts for the head of said striker pin.

3. A motor-vehicle door latch according to Claim 2, in which one side of said entry channel is resiliently braced against the impact of the head of said striker pin by means of a buffer of resilient material upon said pivot pin of the forked latch bolt.

4. A motor-vehicle door latch according to Claim 2, in which one side of said entry channel comprises a flexible strip-like portion of the shroud, said portion having a free end which is located within a slot in a buffer pad of resilient material retained in a recess in said shroud adjacent the entry channel.

5. A motor-vehicle door latch according to any one of the preceding claims, in which the detent member is a flat lever, one end of which is pivoted upon its pivot pin, the other end of which has a tooth thereon engageable with the forked latch bolt.

6. A motor-vehicle door latch according to Claim 5, in which the detent operating member is a lever provided at one end with a cylindrical boss thereon extending at right angles to the plane of the operating lever, said boss having a co-axial bore therethrough the peripheral wall of which acts as a bearing for said second pivot pin, the annular end face of the boss being in contact with the detent member, and rotational driving engagement therewith being effected by a key device.

7. A motor-vehicle door latch according to Claim 6, in which the aperture through which the second pivot pin extends is a cylindrical aperture, the peripheral wall of which acts as a bearing for the boss on the detent operating lever.

8. A motor-vehicle door latch according to any one of Claims 1 to 5, in which the detent operating member comprises a pin mounted at one end to a portion of the detent member remote from the second pivot pin, the free end of said pin extending through a slotted aperture in said shroud adjacent one of said further operating components of the latch.

9. A motor-vehicle door latch according to any one of Claims 1 to 5, in which the detent operating member comprises a lever pivotally mounted at one end thereof on said second pivot pin between the cover plate member and the shroud, and a pin mounted at one end to a portion of the detent member remote from the second pivot pin, the free end of said pin extending through a slotted aperture in said shroud into engagement with said lever intermediate of the ends thereof, said lever being in wiping engagement with a surface of said shroud adjacent said slotted aperture and being dimensioned so as to cover said slotted aperture throughout any pivotal movement of said lever about the second pivot pin.

10. A motor-vehicle door latch according to any one of the preceding claims, in which the shroud is provided with at least one bearing recess for housing one of said further operating components of the latch.

11. A motor-vehicle door latch substantially as hereinbefore particularly described and as shown in Figures 1 to 6 of the accompanying drawings.

12. A motor-vehicle door latch substantially as hereinbefore particularly described and as shown in Figures 1 to 6 as modified by Figures 7 to 10 of the accompanying drawings.

13. A motor-vehicle door latch substantially as hereinbefore particularly described and as shown in Figure 11 of the accompanying drawings.

14. A motor-vehicle door latch substantially as hereinbefore particularly described and as shown in Figure 12 of the accompanying drawings.

15. A motor-vehicle door having

mounted inside thereof a motor-vehicle latch according to any of the preceding claims.

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Agent for the Applicants.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1978.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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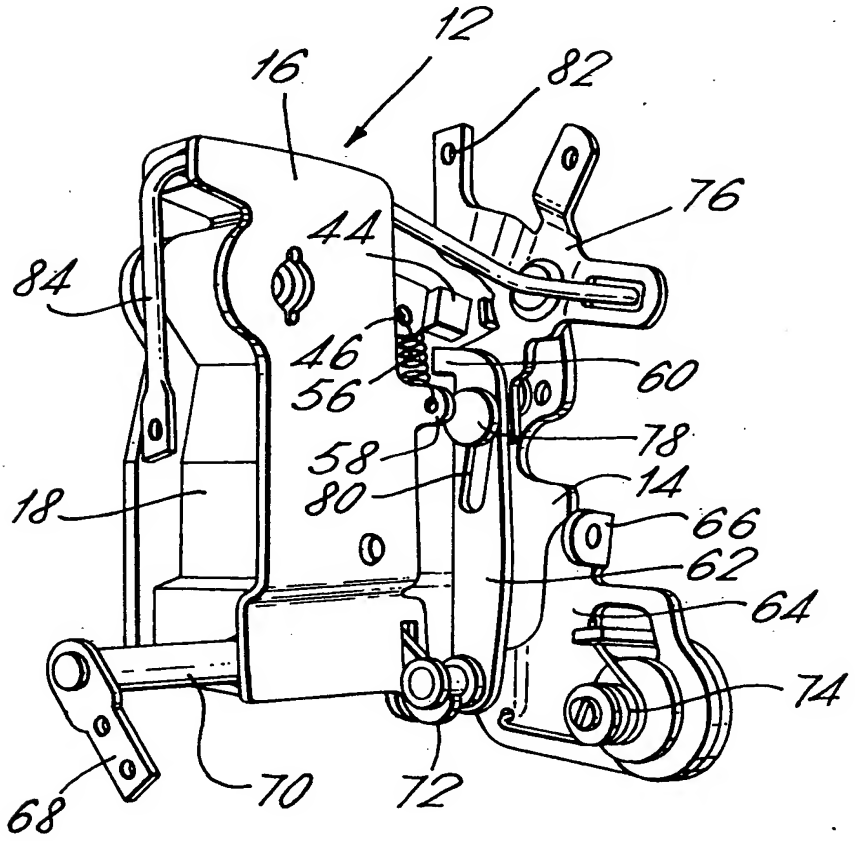
COMPLETE SPECIFICATION

Fig.1.



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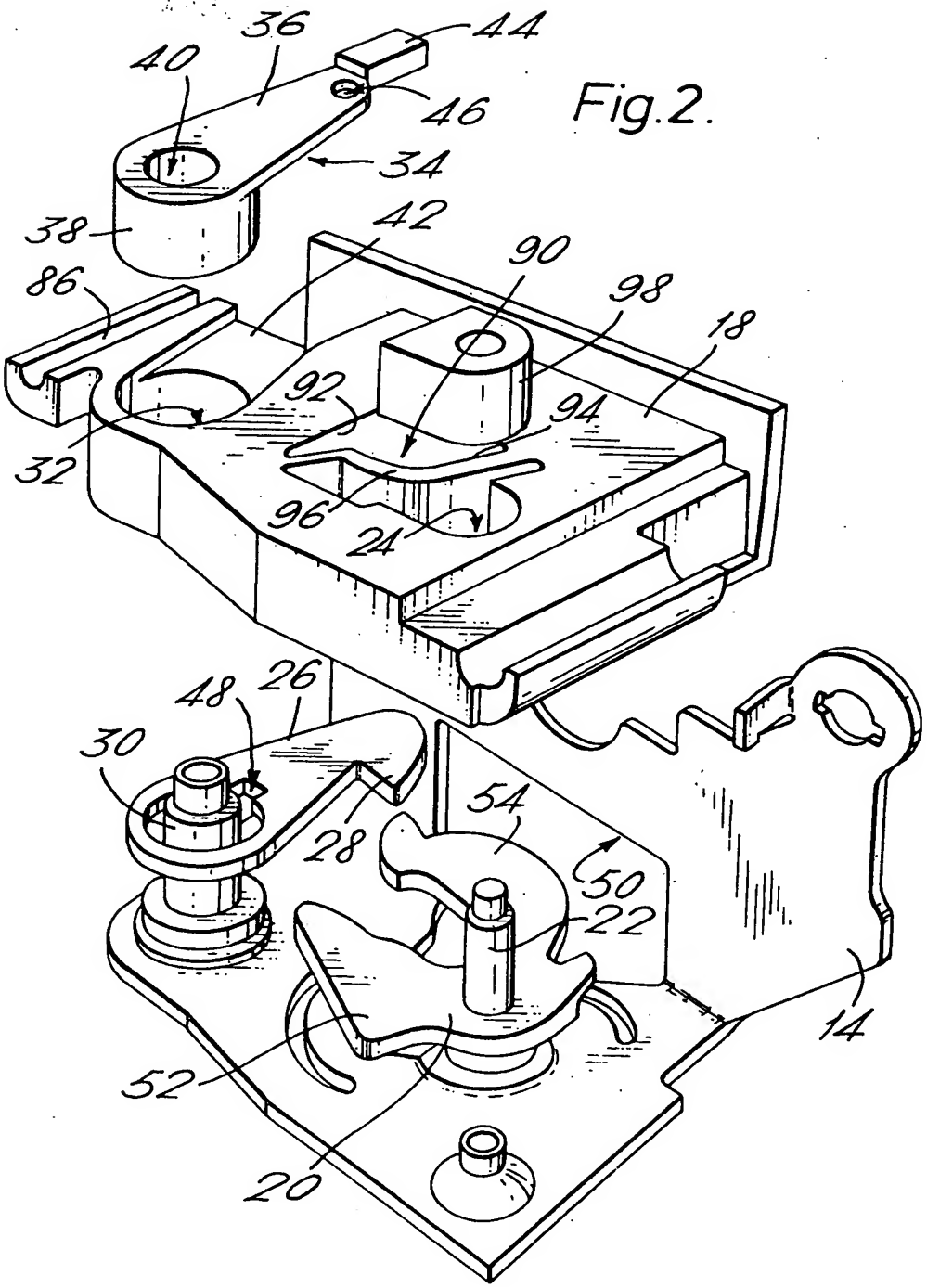

Fig.2.

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SHEET 3

Fig.3.

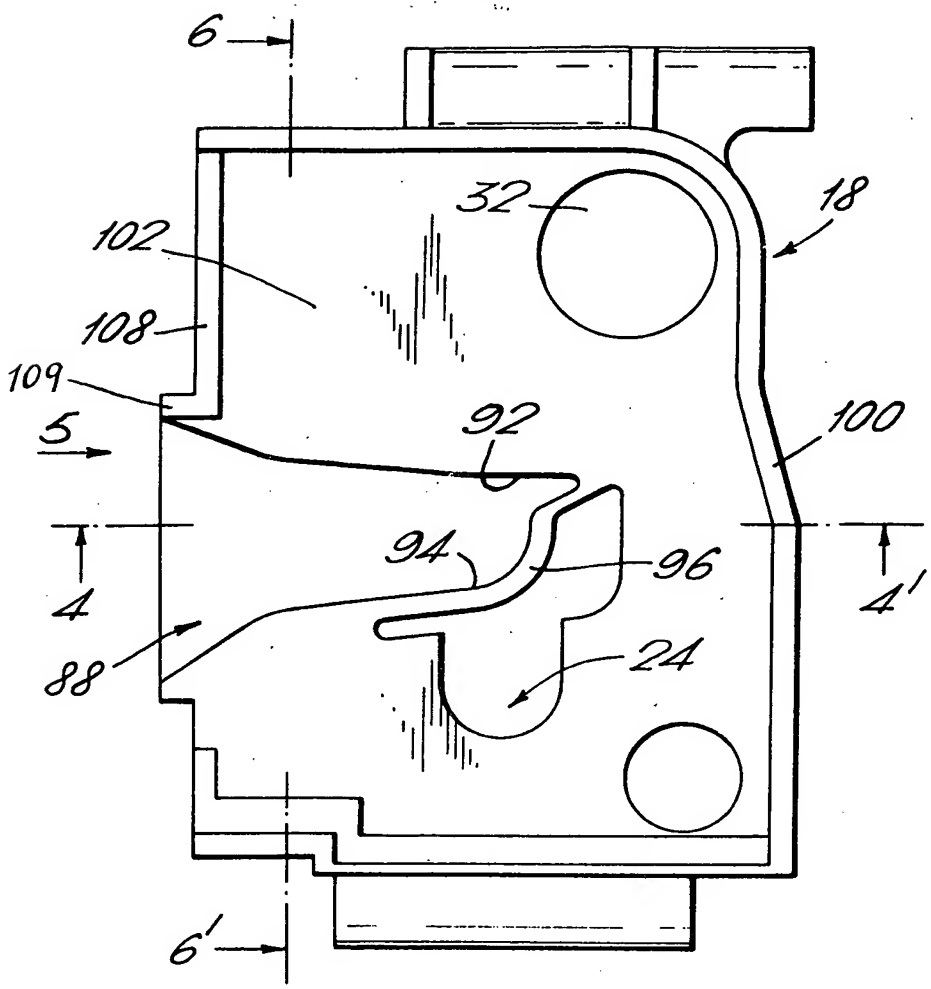

Fig.4.

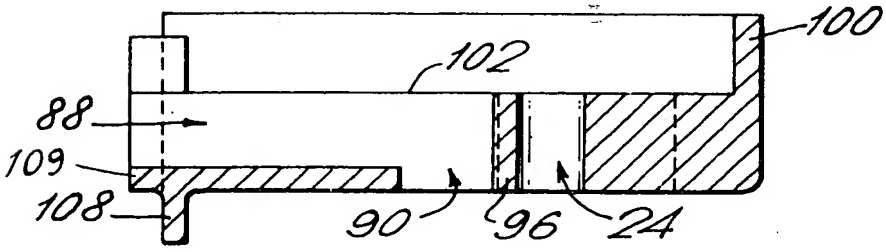

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Fig.5.

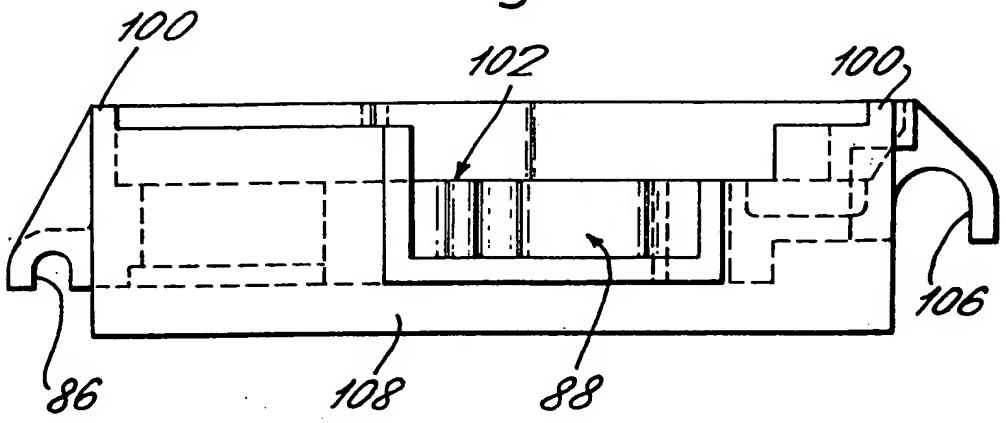

Fig.6.

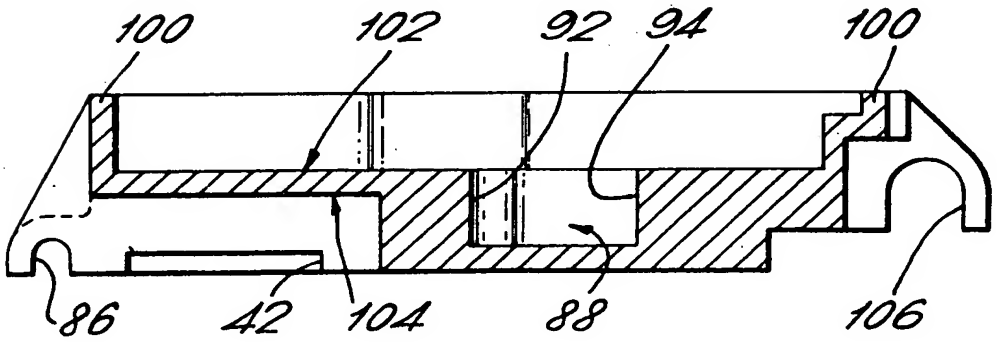

Fig.7.

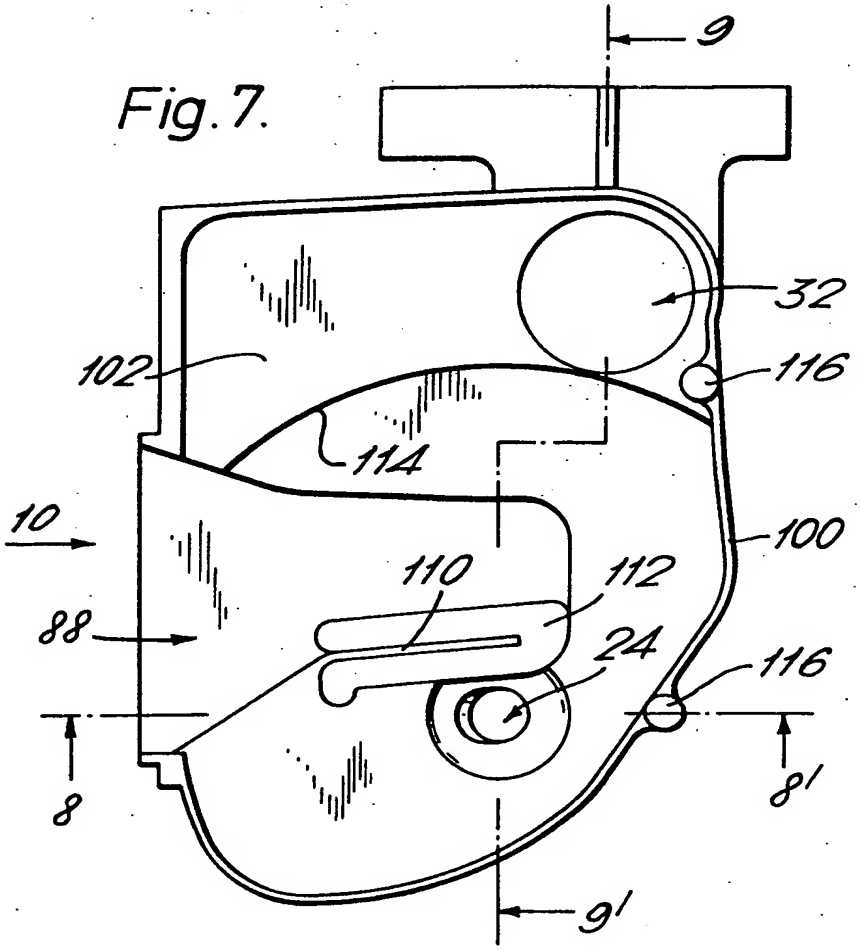

Fig.8.

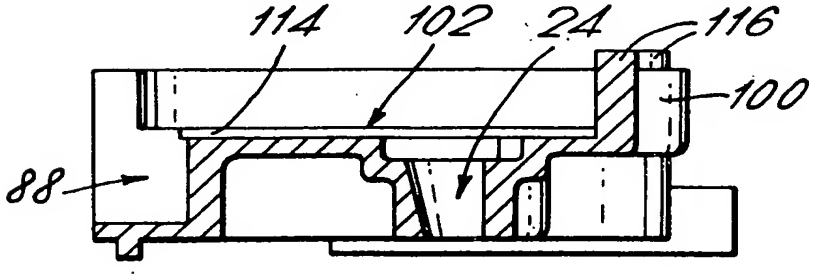

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Fig.9.

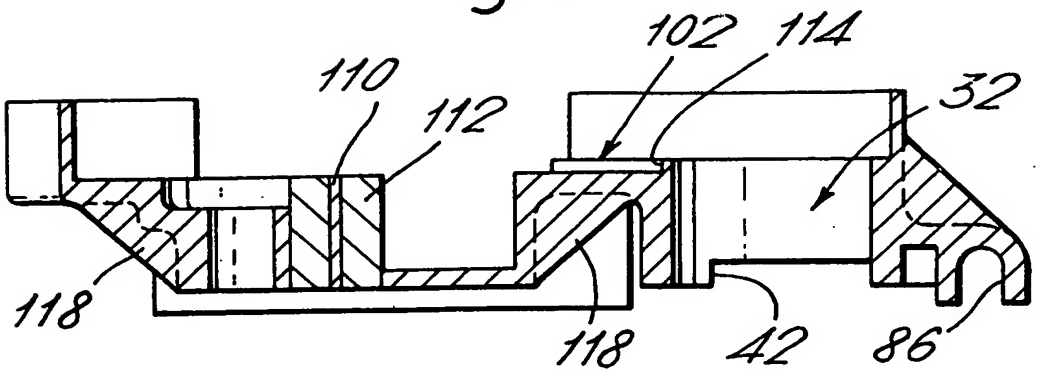

Fig.10.

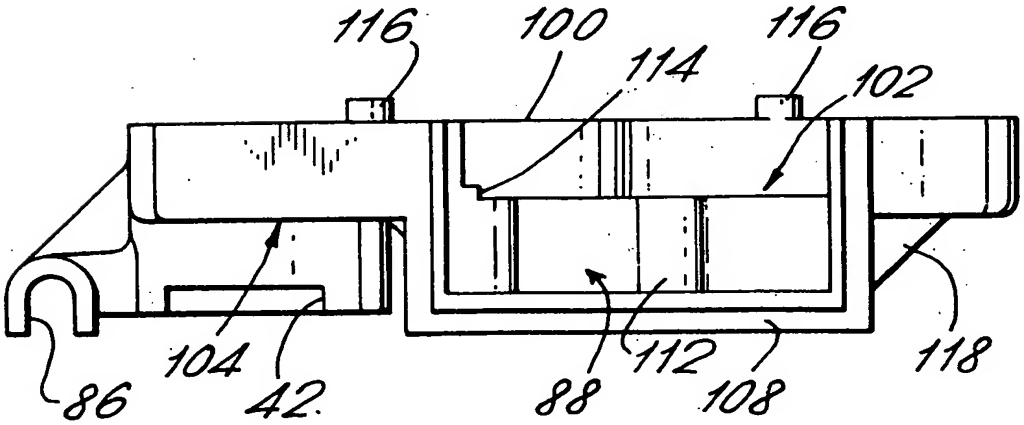

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Fig.11.

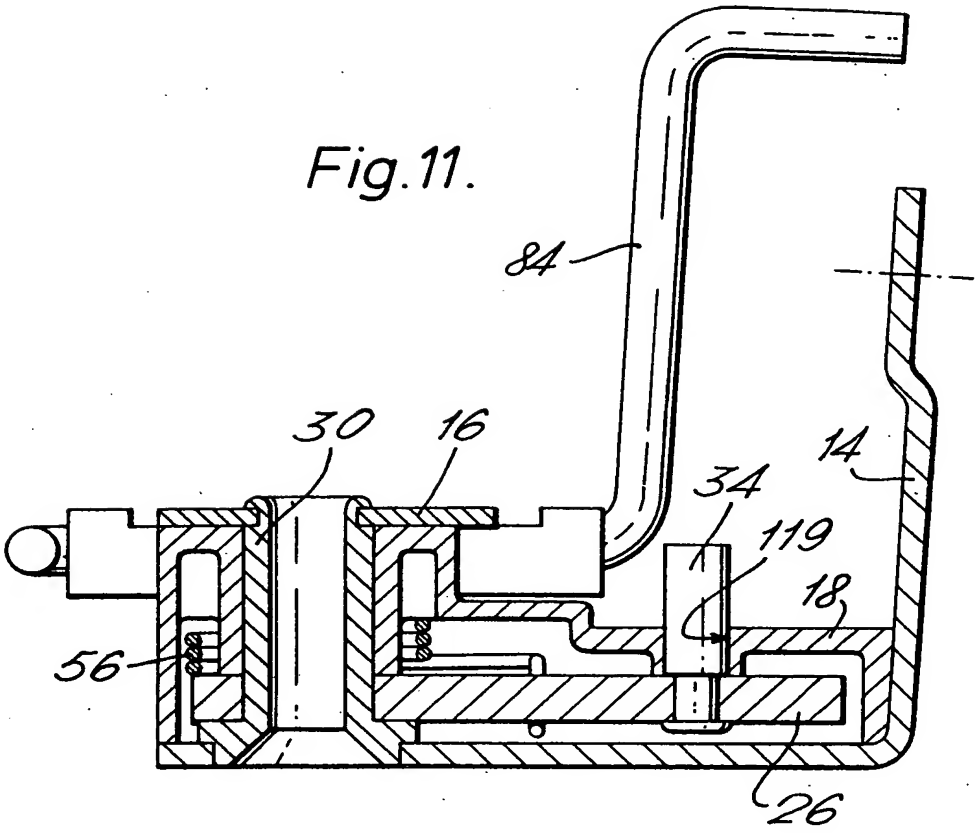

Fig.12.